SUID:

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Exam 2
Spring 2013

DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

Instructions

1. Write your SUID in the upper right corner of this exam. Do NOT write your name.

2. SHOW ALL YOUR WORK. Answers without supporting work will receive little or no credit.

3. Do all your work on this exam. If you need extra space, write on the backs of the pages. However, if you do write an answer on the back of a page, *be sure you've noted that near the question*.

4. There are 60 points on the exam in sections 1a through 3a. Section 3b is optional and worth up to 6 points of extra credit. You'll have 80 minutes to work on it. Budget your time accordingly.

5. Some algebraic relationships for exponents:

$$\left(AB\right)^c = A^c B^c, \qquad A^c A^d = A^{c+d}, \qquad \left(A^c\right)^d = A^{cd}$$

6. The general form of the Cobb-Douglas utility function and its demand equations:

$$U = X^a Y^{1-a} \qquad X = \frac{aM}{P_X} \qquad Y = \frac{(1-a)M}{P_Y}$$

Question 1a (8 points)

A household regards X and Y as perfect complements and always buys *b* units of good Y for each unit of good X.

(a) Please *derive* the household's demand equations for X and Y in terms of *b*, Px, Py and income M. Be sure to show the steps involved, don't just write down the equations.

(b) Determine which one of the households in the table below has perfect complements preferences and calculate the value of *b*.

House	Year	Income	Px	Py	X	Y
A	2011	2400	5	10	80	200
	2012	2700	10	5	120	300
B	2011	900	5	10	120	30
	2012	1200	10	5	40	160
C	2011	800	5	10	80	40
	2012	1200	10	5	60	120

Question 1b (16 points)

Continuing the analysis from 1a, now suppose the government imposes a $10 tax on X and a $1 subsidy on Y. You may assume that the supply of each good is perfectly elastic so the prices become $20 and $4. The household's income, M, is unchanged. Using the household you found in 1a and starting from the 2012 equilibrium please answer the following questions.

(a) Determine the household's new consumption of X and Y. Illustrate the household's new equilibrium with an appropriate diagram.

(b) Calculate the compensating variation for the policy and indicate whether the household is better or worse off.

(c) Calculate the total tax revenue paid by the household and the total value of the subsidy it receives. Then calculate the net value of the two as a share of the household's 2012 income.

Question 2a (8 points)

One of the households in the table below (identical to 1a) has Cobb-Douglas preferences.

(a) Please determine which one and calculate the value of *a* for that household.

(b) Please *derive* the expenditure function for the household. Be sure to show all the steps, not just the final result.

House	Year	Income	Px	Py	X	Y
A	2011	2400	5	10	80	200
	2012	2700	10	5	120	300
B	2011	900	5	10	120	30
	2012	1200	10	5	40	160
C	2011	800	5	10	80	40
	2012	1200	10	5	60	120

Question 2b (16 points)

Now examine the effect of the policy from 1b on the Cobb Douglas household you identified in 2a, starting from its original 2012 equilibrium.

(a) Determine the household's new consumption of X and Y. Illustrate the household's new equilibrium with an appropriate diagram.

(b) Calculate the compensating variation for the policy and indicate whether the household is better or worse off.

(c) Calculate the total tax revenue paid by the household and the total value of the subsidy it receives. Then calculate the net value of the two as a share of the household's 2012 income.

(d) Considering the household in 1a/1b and this household, is the policy progressive or regressive? How can you tell?

Question 3a (12 points)

A household buys two goods, X and Y, and its preferences can be represented by the utility function shown below. Also shown are the household's demand equations and its expenditure function.

$$U = (X + 50)^{0.5}(Y)^{0.5} \qquad X = -25 + \frac{0.5 * M}{P_x}$$

$$M = -50P_x + 2 * U * P_x^{0.5} P_y^{0.5} \qquad Y = \frac{0.5 * M + 25P_x}{P_y}$$

Initially, Px=$10, Py=$10 and M=$2000. The government is considering a policy to raise revenue that would place a $10 tax on good X. The supply of X is perfectly elastic and its price would rise to $20.

(a) Please calculate the initial equilibrium before the policy is enacted and the new equilibrium with the policy in place.

(b) What is the CV for the policy? Is the household better or worse off?

(c) Calculate the income and substitution effects associated with the policy and show them in an appropriate diagram.

(d) How much revenue does the tax raise?

Question 3b (extra credit, 6 points)

Using the household from 3a, now suppose that the government considers an alternative tax policy (only one or the other would be adopted, not both). In this case, it would place a $3 tax on good X and a $1 tax on good Y. The supply of Y is also perfectly elastic so the new prices would be Px=$13 and Py=$11.

(a) Please calculate the household's equilibrium under this policy.

(b) What is the CV relative to the original equilibrium?

(c) How much revenue does the policy raise?

(d) Evaluate this policy relative to the one from 3a. Which is better?